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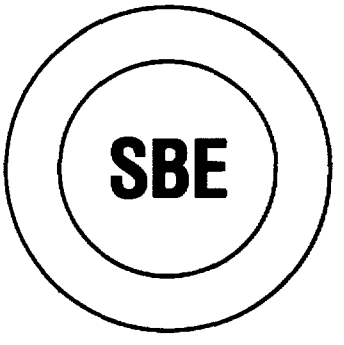
Society of Broadcast Engineers, Inc.

ET Docket 95-18
Allocation of 2 GHz Spectrum for Use by the Mobile-Satellite Service

Petition for Partial Reconsideration of the Second R&O and Second MO&O



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SOCIETY OF BROADCAST ENGINEERS, INC.
Indianapolis, Indiana

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Amendment of Section 2.106 of the	)	ET Docket No. 95-18
Commission's Rules to Allocate	)	Petition for Partial Reconsideration
Spectrum at 2 GHz for Use by	)	
the Mobile-Satellite Service	)	

To: The Commission

Petition for Partial Reconsideration

The Society of Broadcast Engineers, Incorporated ("SBE"), the national association of broadcast engineers and technical communications professionals, with more than 5,000 members in the United States, hereby respectfully submits its Petition for Partial Reconsideration of the July 3, 2000, Second Report and Order and Second Memorandum Opinion and Order ET Docket 95-18 concerning the Mobile Satellite Service ("MSS").

Correction of Center Frequencies Still Needed

1. At Paragraph 29 of the Second Report and Order and Second Memorandum Opinion and Order ("Second R&O") the Commission listed center frequencies for the Phase I two GHz TV Broadcast Auxiliary Services ("BAS") band, as follows:

Channel	Frequency Boundaries	Channel Width	Center Frequency	Channel Increment
1	2,008.0–2,023.0 MHz	15.0 MHz	2,015.50 MHz	14.50 MHz
2	2,023.0–2,037.5	14.5	2,030.00	14.50
3	2,037.5–2,052.0	14.5	2,044.50	14.50
4	2,052.0–2,066.5	14.5	2,059.00	14.50
5	2,066.5–2,081.0	14.5	2,073.50	14.50
6	2,081.0–2,095.5	14.5	2,088.00	14.50
7	2,095.5–2,110.0	14.5	2,102.50	14.50

2. In a July 19, 2000, Erratum, the Commission corrected the center frequencies as follows:

Channel	Frequency Boundaries	Channel Width	Center Frequency	Channel Increment
1	2,008.0–2,023.0 MHz	15.0 MHz	2,015.50 MHz	14.75 MHz
2	2,023.0–2,037.5	14.5	2,030.25	14.50
3	2,037.5–2,052.0	14.5	2,044.75	14.50
4	2,052.0–2,066.5	14.5	2,059.25	14.50
5	2,066.5–2,081.0	14.5	2,073.75	14.50
6	2,081.0–2,095.5	14.5	2,088.25	14.50
7	2,095.5–2,110.0	14.5	2,102.75	14.50

However, and as shown by the attached Figure 1, SBE believes that the Channel A1 center frequency is still not correct, and submits that the correct center frequencies should be as follows:

Channel	Frequency Boundaries	Channel Width	Center Frequency	Channel Increment
A1p1.7	2,008.0–2,023.0 MHz	14.5 MHz	2,015.75 MHz	14.50 MHz
A2p1.7	2,023.0–2,037.5	14.5	2,030.25	14.50
A3p1.7	2,037.5–2,052.0	14.5	2,044.75	14.50
A4p1.7	2,052.0–2,066.5	14.5	2,059.25	14.50
A5p1.7	2,066.5–2,081.0	14.5	2,073.75	14.50
A6p1.7	2,081.0–2,095.5	14.5	2,088.25	14.50
A7p1.7	2,095.5–2,110.0	14.5	2,102.75	14.50

The reason SBE believes that the Channel A1p1.7* center frequency needs to be 2,015.75 MHz rather than 2,015.50 MHz is that a 2,015.75 MHz center frequency will result in uniform 14.50-MHz increments between all seven channels, which will greatly simplify frequency synthesizer design. This would result in a corresponding effective reduction in the Channel A1p1.7 bandwidth from 15.0 MHz to 14.5 MHz, but SBE believes that manufacturers of 2 GHz TV BAS radios will design for uniform bandwidth radios, rather than endure the complexity and expense of having one channel with a different bandwidth. A 2,015.75-MHz Channel A1p1.7 center frequency combined with an effective 14.5-MHz wide channel bandwidth will also provide a 500-kHz guard band between the lower edge of a Channel A1p1.7 signal; such a guard band will be an aid to band edge filtering that will likely be necessary in congested markets.

* SBE suggests an "A*n*p1.7" channel identification format. The "A" is due to the "Band A" identifier in Section 74.602(a)(2) of the FCC Rules; "*n*" is the re-farmed channel number; "p1" for Phase I; and ".7" is to identify the channelization as applying to the seven-channel option as opposed to the six-channel option.

3. If the Commission does not agree that the Channel A1p1.7 center frequency should simply be modified to 2,015.75 MHz and the Channel A1p1.7 bandwidth set to 14.5 MHz, then SBE asks that it at least declare that either 2,015.50 MHz with a 15-MHz wide channel, or 2,015.75 MHz with a 14.5-MHz wide channel, would be acceptable for Channel A1p1.7. Without such clarification manufacturers of microwave transmitters and receivers may feel that they do not have the option for a 14.5-MHz wide Channel A1p1.7 with a 2,015.75 MHz center frequency. In the event the Commission selects the two-bandwidth/two center frequency option, then SBE suggests the channel be identified as A1wp1.7 and A1np1.7, for the wide ("w") option (2,015.50 MHz center frequency with a 15.0-MHz channel width) and the narrow ("n") option (2,015.75 MHz center frequency with a 14.5-MHz channel width).

Split-Channel Operation Under Phase I

4. If a six 17-MHz wide channel Phase I option is selected, then split-channel operation using twelve 10-MHz wide channels, with 750-kHz overlaps with the lower and upper adjacent channels, and with a 1.5-MHz "in-channel" overlap with each other, is feasible; this option is shown in the attached Figure 2, and is specifically permitted by Paragraph 45 of the Second R&O. Stringent frequency coordination efforts must be taken to ensure a better than zero dB desired-to-undesired ("D/U") received signal ratio between the "desired split" and both undesired adjacent splits, in all cases. As has been proven in the Los Angeles market, where the demand for ENG spectrum is extreme, techniques including cross polarization and the routine adjustment of each link's equivalent isotropic radiated power ("EIRP") for the electronic news gathering ("ENG") paths in question can ensure such conditions. SBE anticipates that this option will be popular and applauds its inclusion in the Second R&O.

Eligibility for Reimbursement Must Not Terminate Until the Commission Begins Routinely Authorizing Digital Modulation

5. Paragraph 21 of the Second R&O admits that the future is likely to be digital. Paragraph 13 is more specific in identifying digital operation as more likely to work in 12 MHz channels than analog. But Paragraph 59 will condition all new licenses granted thirty days after the Federal Register publication of the Second R&O as not being eligible for reimbursement, while at the same time the Mass Media Bureau has steadfastly refused to permit the licensing of digital equipment on other than a Special Temporary Authority ("STA") basis! It is inequitable that broadcasters should be essentially forced into buying equipment for the future at a time when the Commission refuses to authorize it on other than a temporary basis.

The level of risk involved is intolerable and has the chilling effect of forcing an effective freeze on the 2 GHz TV BAS band until such time as the Mass Media Bureau gets around to considering digital licensing. This situation is particularly offensive in that the same digital freeze has also disrupted the routine licensing of 950 MHz Aural STL and ICR digital links, which are not tied up in this proceeding at all and the equipment has, in many cases, been type accepted or verified for years! Reconsideration of the restriction in Paragraph 59 is respectfully requested to change the ineligibility for reimbursement from commencing 30 days after publication of the Second R&O in the Federal Register to instead commence 90 days after the Mass Media Bureau completes a rulemaking* that allows the routine licensing of digital BAS microwave links. A 90-day rather than a 30-day period is needed to allow broadcasters sufficient time to properly license existing digital equipment now operated under special temporary authority ("STA") and to complete acquisition of existing equipment now on manufacturer loan for trials. If the Commission elects to allow digital modulation by a blanket Order, rather than to require individual license modifications, then the time interval could be reduced to 30 days from release of a "digital" Order. Presumably this change will have the effect of dragging the Mass Media Bureau into the 21st century, as well as fixing the one major inconsistency in the Second R&O.

Phase II Center Frequencies

6. SBE believes that a correction to the Phase II center frequencies is similarly needed. The center frequencies published in the Second R&O were as follows:

Channel	Frequency Boundaries	Channel Width	Center Frequency	Channel Increment
1	2,025.0–2,037.4 MHz	12.4 MHz	2,031.20 MHz	12.25 MHz
2	2,037.4–2,049.5	12.1	2,043.45	12.10
3	2,049.5–2,061.6	12.1	2,055.55	12.10
4	2,061.6–2,073.7	12.1	2,067.65	12.10
5	2,073.7–2,085.8	12.1	2,079.75	12.10
6	2,085.8–2,097.9	12.1	2,091.85	12.10
7	2,097.9–2,110.0	12.1	2,103.95	12.10

* Namely, the long-stalled EIA/TIA Petition for Rulemaking, RM-9418, filed in March of 1998!

SBE submits that a more appropriate center-frequency assignment would be as follows:

Channel	Frequency Boundaries	Channel Width	Center Frequency	Channel Increment
A1p2.7	2,025.0–2,037.4 MHz	12.1 MHz	2,031.35 MHz	12.10 MHz
A2p2.7	2,037.4–2,049.5	12.1	2,043.45	12.10
A3p2.7	2,049.5–2,061.6	12.1	2,055.55	12.10
A4p2.7	2,061.6–2,073.7	12.1	2,067.65	12.10
A5p2.7	2,073.7–2,085.8	12.1	2,079.75	12.10
A6p2.7	2,085.8–2,097.9	12.1	2,091.85	12.10
A7p2.7	2,097.9–2,110.0	12.1	2,103.95	12.10

As with the Phase I center-frequencies, SBE believes that it is more important to have uniform channel spacings and bandwidth, and to provide a guardband to MSS operations, which for Phase II would be reduced to a 300-kHz guardband. Nevertheless, even a 300-kHz wide guardband would help ensure no band-edge problems between MSS and TV BAS.

7. Again as with Phase I, SBE asks that if the Commission does not agree that the Channel A1p2.7 center frequency should simply be modified to 2,031.35 MHz and the Channel A1p2.7 bandwidth set to 12.1 MHz, then SBE asks that the Commission at least declare that either 2,031.20 MHz with a 12.4-MHz wide channel, or 2,031.35 MHz with a 12.1-MHz wide channel, would be acceptable for Channel A1p2.7. Without such clarification manufacturers of microwave transmitters and receivers may feel that they do not have the option for a 12.1-MHz wide Channel A1p2.7 with a 2,031.35 MHz center frequency. In the event the Commission selects the two-bandwidth/two center frequency option, then SBE suggests the channels be identified as A1wp2.7 and A1np2.7, for the wide ("w") option (2,031.20 MHz center frequency with a 12.4-MHz channel width) and the narrow ("n") option (2,031.35 MHz center frequency with a 12.1-MHz channel width).

Option for Five Instead of Seven Channels for Phase II

8. As documented by the attached Figure 3, SBE requests that the Commission affirm that broadcasters have the option to select five 17-MHz wide channels under Phase II, rather than seven 12.1 MHz wide channels, so as to at least hold open the possibility of continued use of conventional FM video analog operation under Phase II, especially considering the silence of the Second R&O concerning the future of channelization in markets smaller than 100, thus presumably leaving them as five 17-MHz wide channels permanently. Although it is unclear at this time whether such an option will actually be needed if and when Phase II ever gets

implemented, it is important that this option at least be available. SBE proposes that those channels be identified as "A1p2.5" through "A5p2.5", as follows:

Channel	Frequency Boundaries	Channel Width	Center Frequency	Channel Increment
A1p2.5	2,025.0–2,042.0 MHz	17.0 MHz	2,033.50 MHz	17.00 MHz
A2p2.5	2,042.0–2,059.0	17.0	2,051.00	17.00
A3p2.5	2,059.0–2,076.0	17.0	2,067.50	17.00
A4p2.5	2,076.0–2,093.0	17.0	2,084.50	17.00
A5p2.5	2,093.0–2,110.0	17.0	2,101.50	17.00

Split-Channel Operation Under Phase II

9. For the same reasons as split-channel operation is permitted in Phase I, so it should be permitted in Phase II, as already discussed in Paragraph 4 above. However, the Second R&O, while being silent about the future channelization of markets smaller than 100, is also silent about permitting the choice in larger markets to retain five or split-five channel operation. This may be a wiser choice for the future than narrowing to retain seven channels, and it may even be cheaper as well as less disruptive than shifting entire markets around to narrower channels. Reconsideration is requested to specifically allow this option in Phase II as well as Phase I.

Only Standard-Definition "Contribution" Quality Will Be Possible

10. At Paragraph 13 of the Second R&O the Commission stated

> Experimental results confirm that it is possible to carry a contribution-quality television signal in a channel of 12 megahertz bandwidth with the use of digital equipment, and that it may be possible to carry such a signal in a channel of 12 megahertz with analog equipment.

So there can be no confusion now or later, SBE believes it is important to point out that this applies only to a 480I standard-definition television ("SDTV") signal, and not to high-definition video signals such as 720P or 1080I. SBE doubts if digital coding will ever improve to the level where a 720P or 1080I television signal can be compressed so as to fit into an RF bandwidth of 12.1 MHz, or even 14.1 MHz, and be capable of being re-constituted as a contribution-quality signal at the receive end (that is, a signal that can be edited and/or subjected to slow-motion effects), because to obtain such a narrow RF bandwidth severe digital compression and high-order modulation schemes such as 64, 128 or even 256 quadrature amplitude modulation ("QAM") are necessary. However, such high-density

modulation schemes are fragile, and are unlikely to survive the perils of an un-engineered RF path. Even with high-density modulation, lossy compression algorithms must be employed if there is any hope of making a high definition television ("HDTV") signal fit into a 12 to 14 MHz RF bandwidth. Of course, although lossy compression algorithms allow large amounts of bit rate reduction, of necessity the re-constituted signal is an imperfect copy of the original signal. This is acceptable for a final-path-to-the-viewer signal, which is a distribution-quality signal, but can never result in a contribution-quality signal being delivered to a studio that then needs to slice-and-dice the bit stream to assemble a final video stream for distribution to viewers. Further, increased latency is an inevitable consequence of increased digital compression, which renders such a "treated" picture less acceptable in anything approaching a live environment, such as for sporting events, where HDTV is known to make a significant improvement in the viewer experience. Therefore let it be clear to all parties, Congress, the FCC, MSS, and the viewing public: 12.1 MHz wide, or even 14.5 MHz wide, 2 GHz TV BAS channels means no contribution-quality HDTV relayed by such narrow RF channels; or, in other words, standard definition "yes," HDTV "no," barring a revolutionary advance in modulation techniques, compression algorithms, or both, such as cannot even be dreamed of today.

11. Once the SDTV limitation is accepted and understood, then additional options become possible. While split-channel operations in analog overlap the channels somewhat, digital split-channel operations do not need to overlap if the digital channel widths are somewhat narrower than a split-channel analog signal; this is just as well, because digital operations do not take well to overlapping channels. To truly split a 17-MHz channel, the resulting splits must each not exceed 8.5-MHz wide. In test reports prepared and filed by the Walt Disney Company in this proceeding in February and April of 1999, results were reported on three digital systems all operating in channels less than 10 MHz wide. An NDS prototype COFDM system was cited as carrying 21 Mbps in 7.61 MHz, a Zenith 8VSB system carried 19.36 Mbps in 6 MHz (though not robustly), and an NEC COFDM system operated in 9 MHz wide channels. Even presuming that these cited bit rates were for net data throughput, as opposed to data plus forward error correction (the reports are not completely clear on this issue), that rate corresponds with only final to-the-viewer distribution for HDTV. However, it does correspond well with contribution-quality for NTSC or SDTV. In short, the future of ENG may be SDTV operation on digital, 8.5 MHz-wide, non-overlapping channels. It will also be more spectrum-efficient and much less confusing to split 17 MHz-wide channels for digital SDTV rather than 12 MHz-wide channels. SBE believes that any time you can do the

math without a calculator, results are better for everyone. And, depending on the state of the art when (or if) Phase II is implemented, it may even be significantly cheaper than reshuffling entire markets to narrower channels. Finally, it would remain possible to attempt to coordinate two (or more) adjacent channels to obtain enough bandwidth for a near-contribution quality HDTV feeds (albeit most likely on rare occasions, possibly for major weekend sporting events).

Small Market Fixed Links

12. The Second R&O is silent concerning the specific problem of any fixed links which may be operating in markets smaller than 30, because fixed links generally use equipment which is not frequency agile. Although such equipment does not need to be retrofitted to narrower channels (at least, not immediately, depending upon other considerations in markets 31-100), it also cannot simply be switched to another channel, nor can it be ordered off the air without loss of the service it is providing. Operators of non-frequency agile fixed links operating on Channel A1 in Phase I, and Channel A2 in Phase II, in all markets smaller than 30 are entitled to the minimal reimbursement necessary to change channels in both the transmitter and receiver and modify their single-channel licenses accordingly. Reconsideration of this omission is hereby requested, lest those licensees be left with not just non-equivalent facilities, but no facilities at all.

Smaller Market Disrupted by Larger Market

13. At many locations across the United States, smaller markets directly adjoin larger markets. In some of those cases (*e.g.*, San Francisco-Fresno), facilities in the larger market are capable of reaching into and causing interference in the smaller market even while operating within the bounds of the larger market. In some circumstances, the smaller market may be forced into some reconfiguration, either prematurely or not by choice, in order to eliminate or avoid interference conditions caused by actions of larger market stations which are necessary for their congested conditions. These are out-of-pocket costs caused directly by the advent of MSS, yet the Second R&O is silent concerning such cases. While it is difficult to cover the universe of situations in advance in a general order, unless some guidance is provided, negotiations in such situations could be acrimonious or litigious.

Summary

14. SBE realizes that the Commission's options were restricted first by international mandates and then by Congressional intervention, and believes that Commission staff were nevertheless able to craft a decision that provided an acceptable compromise for broadcasters. SBE applauds this effort. The proposed changes to the Channel A1p1.7 and Channel A1p2.7 center frequencies should be viewed only as a technical "fine tuning." The option for five 17-MHz wide channels in Phase II may never be needed, but it is important that there be no question that such an option is available. Finally, fairness demands that the effective date for eligibility for reimbursement be extended to 90 days after the Commission completes a rulemaking allowing the routine licensing of TV BAS links employing digital modulation, or to 30 days after the Commission issues an Order allowing TV BAS stations to use digital modulation.

List of Figures

15. The following figures or exhibits have been prepared as a part of these SBE reply comments:

1. Figure showing the Phase I band plan
2. Figure showing split-channel operation
3. Figure showing the Phase II band plan.

Respectfully submitted,

Society of Broadcast Engineers, Inc.

By _____
James (Andy) Butler, CPBE,
SBE President

By _____
Dane E. Ericksen, P.E., CSRTE
Chairman, SBE FCC Liaison Committee

By _____
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September 5, 2000

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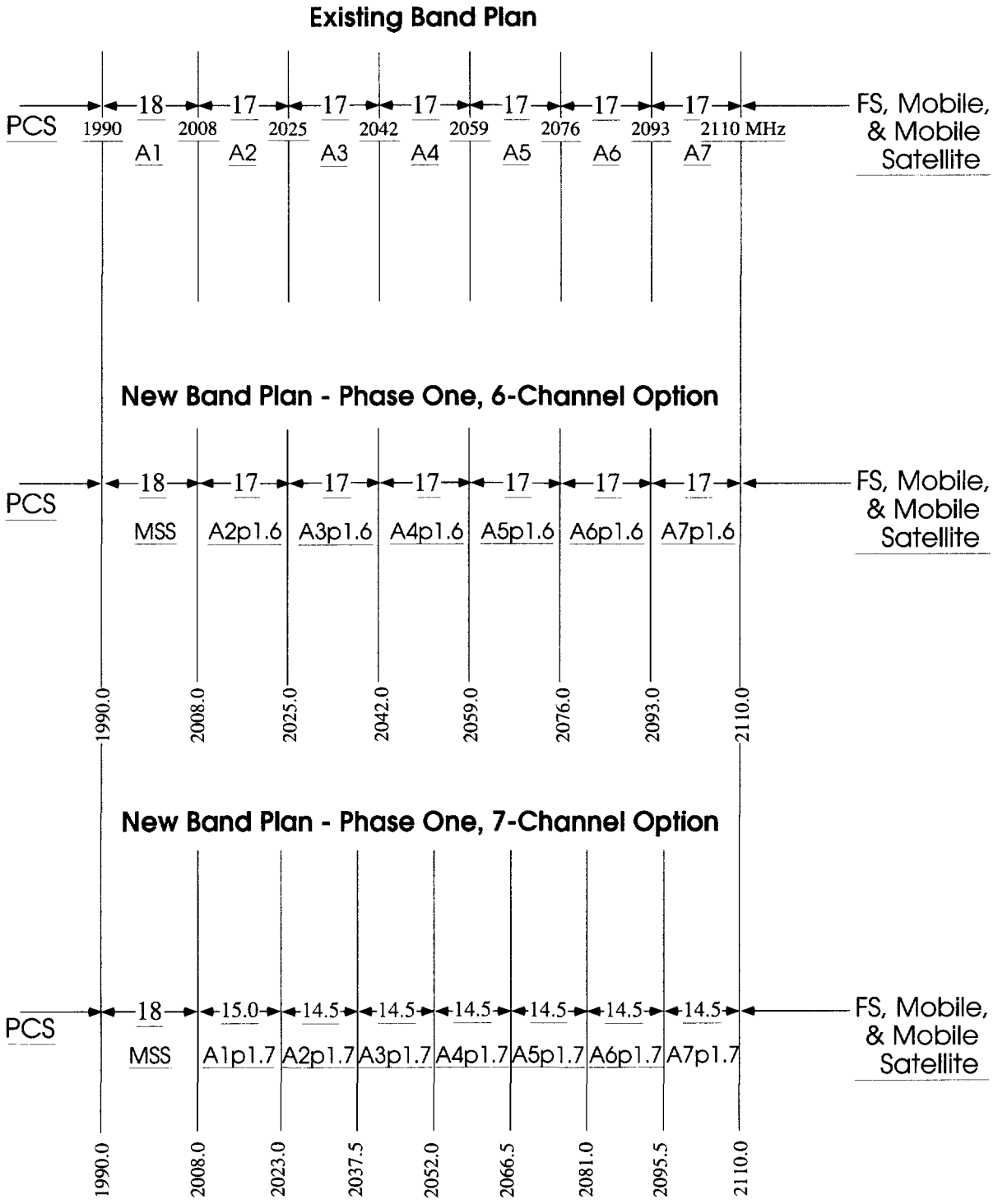
ET Docket 95-18 Second Report & Order

Existing v. Phase One 2 GHz BAS Band Plan Including the 6-Channel versus 7-Channel Option



All frequencies and bandwidths are in MHz.

SOCIETY OF BROADCAST ENGINEERS, INC.
Indianapolis, Indiana

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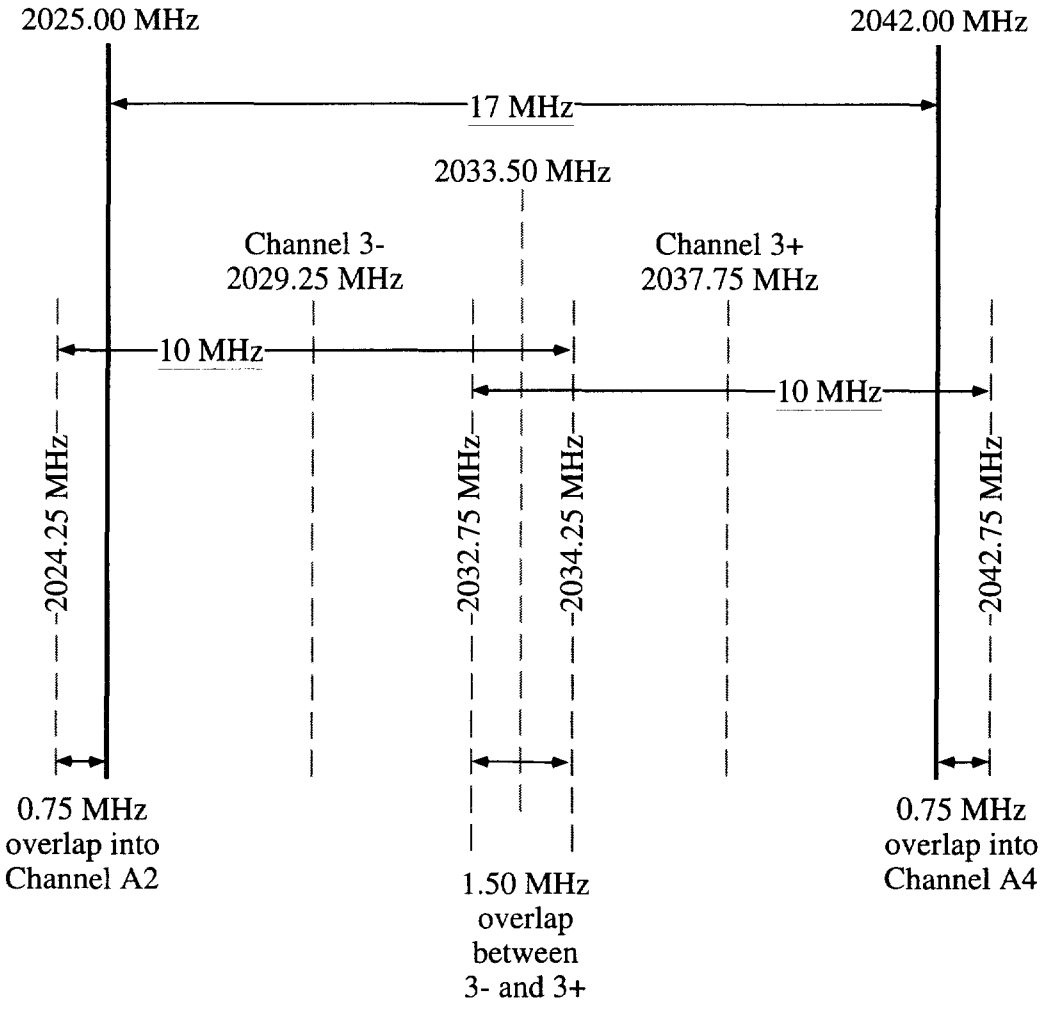
Figure 1

ET Docket 95-18 Second Report & Order

Example of Split-Channel Operation
ENG Channel A3



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Indianapolis, Indiana

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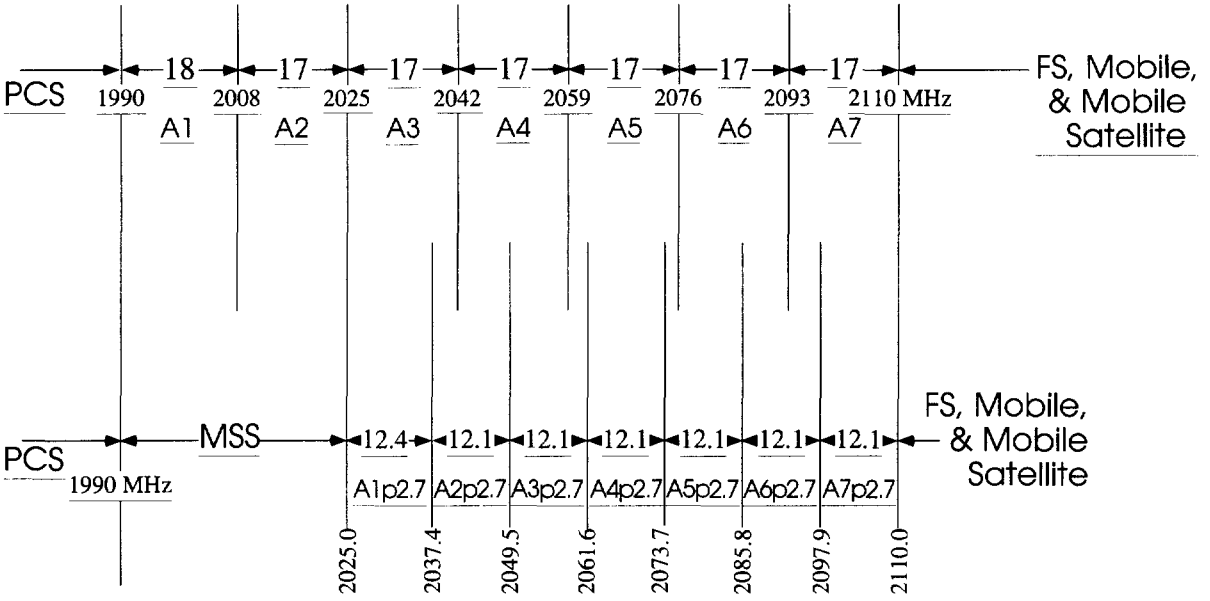
Figure 2

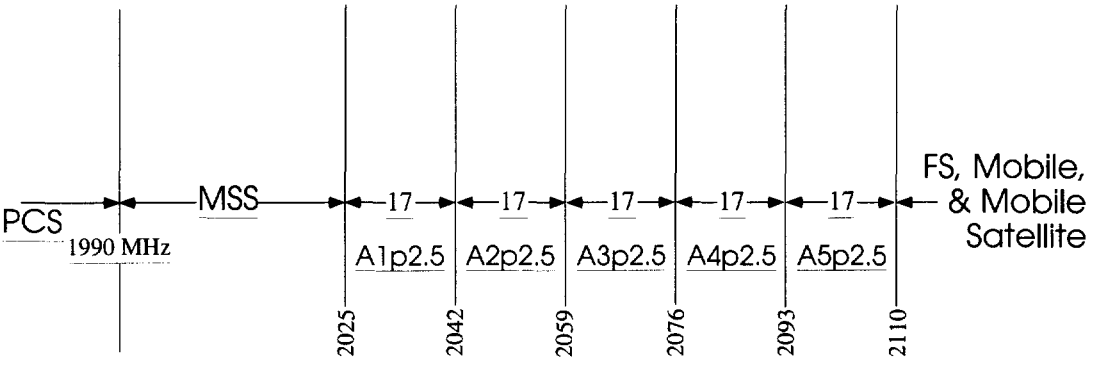
ET Docket 95-18 Second Report & Order

Existing v. Phase Two 2 GHz BAS Band Plan (Indefinite Adoption Date) with a 5-Channel Phase Two Option

Existing Band Plan



New Band Plan - Phase Two (indefinite adoption date) 7-Channel Option



New Band Plan - Phase Two (indefinite adoption date) 5-Channel Option

All frequencies and bandwidths are in MHz.